Name:

at1117paper: Complete the Square (v311)

Example

A square's edge length is x feet. A rectangle has a height of x feet and a width of 52 feet. Their combined area, found by adding the square's area and the rectangle's area, is 1173 square feet. What is the value of x?

Example's Solution

$$x^2 + 52x = 1173$$

To complete the square, add $\left(\frac{52}{2}\right)^2 = 676$ to both sides.

$$x^2 + 52x + 676 = 1849$$

Recognize the left side is now a perfect-square trinomial. Factor the left side.

$$(x + 26)^2 = 1849$$

Undo the squaring.

$$x + 26 = \pm\sqrt{1849}$$

$$x + 26 = \pm 43$$

Subtract 26 from both sides.

$$x = -26 \pm 43$$

In this geometric example, we are only concerned about the positive solution. So,

$$x = 17$$

Question 1

A square's edge length is x feet. A rectangle has a height of x feet and a width of 60 feet. The total area, of the square and rectangle, is 2236 square feet. What is the value of x?

$$x^2 + 60x = 2236$$

$$x^2 + 60x + 900 = 3136$$

$$(x + 30)^2 = 3136$$

$$x + 30 = \pm 56$$

$$x = 26$$

Question 2

A square's edge length is x feet. A rectangle has a height of x feet and a width of 52 feet. The total area, of the square and rectangle, is 768 square feet. What is the value of x?

$$x^2 + 52x = 768$$
$$x^2 + 52x + 676 = 1444$$
$$(x + 26)^2 = 1444$$
$$x + 26 = \pm 38$$
$$x = 12$$

Question 3

A square's edge length is x feet. A rectangle has a height of x feet and a width of 50 feet. The total area, of the square and rectangle, is 975 square feet. What is the value of x?

$$x^2 + 50x = 975$$
$$x^2 + 50x + 625 = 1600$$
$$(x + 25)^2 = 1600$$
$$x + 25 = \pm 40$$
$$x = 15$$